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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/722,776

11/26/2003

Haixun Wang

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EXAMINER

BITAR, NANCY

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/722,776	<b>Applicant(s)</b> WANG ET AL.	
	<b>Examiner</b> NANCY BITAR	<b>Art Unit</b> 2624	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 October 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 June 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's response to the last Office Action, filed 6/24/2008, has been entered and made of record.

2. Claims 1-20 are currently pending.

3. Applicants arguments filed 10/24/2008 have been fully considered but they are not persuasive.

4. Applicant argues that while the process of clustering and " finding the nearest neighbor" share the concept of pattern similarity, the result of the process are not the same . and once the clustering in completed, however the nearest neighbor of a given data item is still not know.

Additionally the applicant argues that Brin does not disclose or suggest defining subspace correlation between two or more of the objects in the set based on the identified subspace pattern similarities for use in identifying near-neighbor object.

5. In response, Examiner disagrees with applicant since when each object represents its own cluster; the distances between those objects are defined by the chosen distance measure. However, once several objects have been linked together, we determine the distances between those new clusters by finding the "nearest neighbors" across clusters to determine the distances between clusters; therefore Wang et al teaches the method by identifying subspace clusters in high-dimensional data sets, section 1.3 and where the similarity model used in data retrieval and nearest neighbor search is based on value similarity (section 6).. Moreover, Examiner used a

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secondary reference, Brin et al. , to explain the near neighbor object in large metric spaces wherein two or more data are correlated according to their similarity. Bin teaches the use of pairwise Clustering, column 2, lines 1-7; in order to increase the efficiency of determining the pattern similarity. All remaining arguments are reliant on the aforementioned and addressed arguments and thus are considered to be wholly addressed herein.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al (Clustering by Pattern Similarity in Large data Sets, ACM SIGMOD' 2002 June 4-6, Madison Wisconsin, USA) in view of Brin et al (Near Neighbor Search in Large Metric Spaces, Nov 20, 1995).

As to claim 1, Wang teaches a method for use in finding near-neighbors in a set of objects comprising the steps of: identifying subspace pattern similarities that the objects in the set exhibit in multi-dimensional spaces (identifying subspace clusters in high-dimensional data sets, section 1.3); and defining subspace correlations between two or more of the objects in the set based on the identified subspace pattern similarities for use in identifying near-neighbor objects. Wang discloses clustering by pattern similarity in large data sets (see abstract), including the further limitation wherein the distance function -comprises the following: given two data

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objects  $x$  and  $y$ , a subspace  $S$ , and a dimension  $k \in S$ , the sequence-based distance between  $x$  and  $y$  is as follows:  $\text{dist}_{k, S}(x, y) = \max_{i \in S} (x_i - y_i) - (x_k - y_k)$  (see section 4.1: Pairwise Clustering, column 2, lines 1-7; in order to increase the efficiency of determining the pattern similarity). Specifically, Brin et al. teaches a simplified algorithm (section 4.1 and pages 8-10) wherein the model of finding near neighbors in a large metric space wherein every data type has some degree of correlation in its distribution, it must be exploited to get good performance in a near neighbor search. It would have been obvious to one of ordinary skill in the art to use the nearest neighbor statistical tool in Wang tool in order to compute a relatively fast and accurate computation to narrow the search quickly and then apply proper edit distance to complete the search. Therefore, the claimed invention would have been obvious to one of ordinary skill in the art at the time of the invention by applicant.

As to claims 2, Wang et al. in view of Brin et al., teaches the method of claim 1, wherein the identifying step further comprises the step of creating a pattern distance index (Euclidean distance, section 1.1).

As to claim 3, Wang et al. in view of Brin et al., Brin et al. teaches the method of claim 1, wherein the multi-dimensional spaces comprise arbitrary spaces (arbitrary metric spaces, page 4, Large Metric Spaces, section 3).

As to claims 4- 5, Wang et al. in view of Brin et al., Wang et al. teaches the method of claim 4, wherein the subspace dimensionality is an indicator of a degree of similarity between the objects (section 4.1).

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As to claim 6, Wang et al. in view of Brin et al., Wang et al. teaches the method of claim 1, wherein data relating to the objects is static (there is no coherence need to be related by shifting or scaling the objects, section 1.4).

As to claim 8, Wang et al. in view of Brin et al., Wang et al. teaches the method of claim 1, wherein data relating to the objects comprises gene expression data (the gene expression data are organized as matrices, section 1.2).

As to claims 7 and 9, Wang et al. in view of Brin et al., Wang et al. teaches the method of claim 1, wherein data relating to the objects comprises synthetic data and dynamic data (synthetic and real life data sets, section 5).

As to claim 10, Wang et al. in view of Brin et al., Brin et al. teaches the method of claim 1, wherein identifying the subspace pattern similarities comprises a comparison of any subset of dimensions in the multi-dimensional spaces (section 4.4, page 9).

As to claim 11, Wang et al. in view of Brin et al., Wang et al. teaches the method of claim 1, wherein identifying the subspace pattern similarities comprises an ordering of dimensions in the multi-dimensional spaces (section 4.1,  $S(x, y, 7-) = \{dxa - dya \mid a \in T\}$ )

. As to claims 12- 13, Wang et al. in view of Brin et al., Wang et al. teaches the method of claim 12, wherein a first pair in the sequence of pairs comprises a base of comparison for one or more remaining pairs in the sequence of pairs (figure 13).

As to claim 14, Wang et al. in view of Brin et al., Wang et al. teaches the method of claim 12, wherein the sequence of pairs is represented sequentially in a tree structure comprising one or more edges and one or more nodes (section 4.3: Main algorithm and figure 10).

As to claim 15, Wang et al. in view of Brin et al., Wang et al. teaches the method of claim 2, wherein creating the pattern distance index comprises use of pattern-distance links (figure 9-10).

As to claim 16, Wang et al. in view of Brin et al., Wang et al. teaches the method of claim 1, wherein the process is optimized by maintaining a set of embedded ranges (embed random value ranges from 0-500, section 5.1).

As to claim 17, Wang et al. in view of Brin et al., Wang et al. teaches the method of claim 1, wherein the subspace correlations comprise a distance between two or more of the objects in the set (objects based on their distances which are measured by distance function e.g. Euclidean; section 6).

The limitation of claim 18 has been addressed above except for the following:” performing a near neighbor search”. Brin et al teaches that limitation in section 4, GNAT (pages 7-8).

Claims 19-20 differ from claim 1 only in that claims 19-20 are program claims whereas, claim 1 is an apparatus claim. Thus, claims 19-20 are analyzed as previously discussed with respect to claims above.

### ***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NANCY BITAR whose telephone number is (571)270-1041. The examiner can normally be reached on Mon-Fri (7:30a.m. to 5:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on 571-272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jingge Wu/  
Supervisory Patent Examiner, Art Unit 2624



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/Nancy Bitar/

Examiner, Art Unit 2624